

TABLE 3.—*Floods of the South Atlantic and East Gulf States during May, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Fect.</i>			<i>Fect.</i>	
Dan.....	Danville, Va.....	8.0	24	34	8.0	24
Roanoke.....	Weldon, N. C.....	30.0	26	26	30.8	26
Santee.....	Rimini, S. C.....	12.0	27	28	12.6	28
Do.....	Ferguson, S. C.....	12.0	6	.....	11.9	29
Saluda.....	Pelzer, S. C.....	7.0	25	25	7.8	25
Wateree.....	Camden, S. C.....	24.0	25	25	24.0	25
West Pearl.....	Pearl River, La.....	13.0	11	12	13.3	11, 12
Do.....	do.....	13.0	26	31	15.2	27

TABLE 4.—*Floods in the rivers of Michigan and New England during May, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Fect.</i>			<i>Fect.</i>	
Cass.....	Vassar, Mich.....	14.0	28	29	14.9	29
Tittabawassee.....	Midland, Mich.....	12.0	11	12	12.6	11
Grand.....	East Lansing, Mich.....	7.5	16	18	9.3	17
Do.....	Grand Ledge, Mich.....	6.5	.....	.....	6.4	17
Connecticut.....	White River Junction, Vt.....	13.0	18	19	13.1	18
Merrimac.....	Franklin Junction, N. H.....	13.0	18	18	14.9	18

TABLE 5.—*Floods in the rivers of the Pacific slope during May, 1916.*

River.	Station.	Flood stage.	Above flood stage.		Crest.	
			From—	To—	Stage.	Date.
		<i>Fect.</i>			<i>Fect.</i>	
Colorado.....	Topock, Ariz.....	14.0	14	21	17.8	17
Gunnison.....	Sapinero, Colo.....	16.0	8	14	17.8	10, 11
Do.....	Paonia, Colo.....	8.0	6	13	9.1	10
Do.....	Delta, Colo.....	9.0	10	11	9.2	10
Columbia.....	Vancouver, Wash.....	15.0	7	18	18.3	11
Do.....	do.....	15.0	22	26	15.5	24
Clearwater.....	Kamiah, Idaho.....	12.0	7	7	12.2	7
Willamette.....	Portland, Oreg.....	15.0	7	18	18.1	11
Do.....	do.....	15.0	23	25	15.2	24, 25
Kings.....	Piedra, Cal.....	12.0	4	10	12.7	6
San Joaquin.....	Firebaugh, Cal.....	12.0	.....	.....	11.9	13
Do.....	Lathrop, Cal.....	17.0	.....	.....	16.9	9

RAINFALL AND FLOODS IN CHINA.

At the request of the Chinese Government the American Red Cross Society appointed in 1914 a board of engineers, including Col. William L. Sibert, Prof. Daniel W. Meade and Mr. A. P. Davis, to report on a method of preventing or mitigating the great damages caused by the floods of the Hwai-ho (which lies between the Hwang and the Yangtze rivers). Among the party which visited the drainage basin and studied the physical conditions was Mr. S. T. Suen who made a report on the rainfall conditions over the basin and has published an abstract of his paper in the Chinese Students' Monthly for March, 1915.¹

After discussing the causes of rainfall and of floods Mr. Suen takes up the climate and rainfall of China, particularly the latter and bases his study upon the same compila-

tion of data by Louis Froc which Mr. Chu has employed for his study on another page of this issue.

Mr. Suen finds that the intense summer heat of the subtropical southern portion of China maintains the atmosphere there in a state of unstable equilibrium, so that there the convective rainfall accompanying the frequent thunderstorms is heavy.

Again the prevailing summer wind is an east wind heavily loaded with moisture from the Pacific. This moisture is combed out by the mountain ranges close to and paralleling the coast, so that there is a heavy "orographic rainfall" on the windward slopes of the mountains and a correspondingly drier climate farther inland. The westward-pointing rain shadow of these ranges is marked even in the interior.

In addition to the two causes mentioned, and the most fruitful, is the heavy cyclonic rainfall which accompanies the typhoons that frequently visit the southeastern part of China during the summer and fall months.

In general the summer rainfall is much heavier than the winter fall; this is shown also by the maps on pages 280-1. This is particularly the case for the extreme southern and northern regions; the middle, the Yangtze valley, and the coast districts have a more uniformly distributed fall. But a given percentage of the annual fall means three times as much rain in the southern region as it does in the extreme north. The winter precipitation in northern China is very small and usually in the form of snow so that the summer rainfall there, while not as heavy as in the south, makes a preponderating percentage of the total.

Rainfall and flood.—Some Chinese stations have observed 20 to 25 inches of rain resulting from a single storm. Such excessive rain invariably leads to floods. A storm of 5 to 10 inches may be sufficient to produce a flood if the character of the drainage area is favorable thereto; and in the valley of the Hwai-ho floods are frequently brought about even during years of normal rainfall, by reason of the imperfect drainage system. An examination of the map of China will recall to the reader that the lower course of the Hwai-ho labors through the maze of a temporarily abandoned portion of the delta of the Hwang-ho. For example, the flood of July, 1906, in this valley was accompanied by an average fall of 7 inches of rain; in the flood of August, 1910 over the same area, resulting in the famine of 1911, more than 11 inches of rain fell over the drainage area of the Hwai. In In Anhwei and 10 miles north of Pengpu there was a fall of 25 inches in 48 hours during this storm of August, 1910. In the Ohio flood of 1913, the record for half a century of observations, an average of 8 inches of rain in three days fell over the Ohio basin.

A great flood occurred in the Sikiang valley during the summer of [1914], but so far no rainfall reports have been received.

TABLE 1.—*Mean monthly number of storms accompanied by more than 1 inch of rain.*

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Tamingfu.....	0.0	0.0	0.4	0.0	0.2	0.4	1.0	0.8	1.4	0.4	0.0	0.0
Weihsueifu.....	0.0	0.0	0.0	0.0	0.0	0.4	1.4	0.6	1.4	0.0	0.0	0.0
Hoklo.....	0.1	0.0	0.4	0.4	0.5	2.1	1.8	0.6	0.5	0.5	0.2	0.0
Chinkiang.....	0.4	0.2	0.5	0.7	0.6	1.6	1.5	1.5	1.0	0.3	0.3	0.0
Hankow.....	0.2	0.4	0.6	1.5	1.8	2.0	1.9	1.0	0.6	0.6	0.4	0.1

¹ Suen, S. T. The causes of rainfall and floods in China. Chinese Students' Monthly, Ithaca, N. Y., Mar. 1915, no. 6, 10:365-377, with 3 figures.

TABLE 2.—Mean annual numbers of storms accompanied by more than 1 inch of rain.

Stations.	Record.	1-2 inches.	2-3 inches.	3-5 inches.	5-7 inches.	7-10 inches.	10 inches and over.	Annual total.
	<i>Years.</i>							
Tamingfu.....	5	2.0	1.2	1.2	.....	.....	0.2	4.6
Welhweifu.....	5	1.4	0.4	0.8	0.2	0.2	0.4	3.8
Hoku.....	8	2.6	2.2	1.5	0.5	.....	0.3	7.1
Chinkiang.....	22	4.3	2.0	1.3	0.7	0.4	0.2	8.9
Hankow.....	22	4.7	2.4	2.0	1.1	0.5	0.3	11.0

Floods are thus the direct result of abnormal conditions as to rainfall. Ordinary floods may be defined as those to be expected two or three times in 10 years, while extraordinary floods come but once or twice in a century. The study of flood frequencies leads to that of storm frequency and Mr. Suen presents his results in Tables 1 and 2.—C. A. jr.

MEAN LAKE LEVELS DURING MAY, 1916.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., June 5, 1916.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during May, 1916:				
Above mean sea level at New York.....	<i>Feet.</i> 603.00	<i>Feet.</i> 580.49	<i>Feet.</i> 572.87	<i>Feet.</i> 247.13
Above or below—				
Mean stage of April, 1916.....	+0.62	+0.57	+0.45	+0.73
Mean stage of May, 1915.....	+1.39	+0.87	+1.19	+1.98
Average stage for May, last 10 years.....	+1.14	-0.08	+0.14	+0.33
Highest recorded May stage.....	-0.05	-3.03	-1.55	-1.82
Lowest recorded May stage.....	+2.18	+0.93	+1.56	+2.17
Average relation of the May level to:				
April level.....	+0.3	+0.3	+0.3	+0.4
June level.....	-0.3	-0.2	-0.1	-0.1